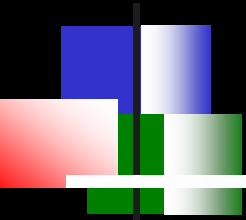
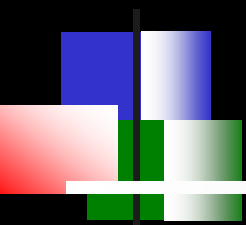


# Understanding LED: An Overview of the Technology and the Market



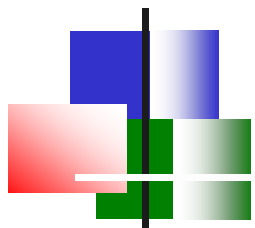


Brian K. Owen  
greenTbiz / LEDs Magazine

2009 ENERGY STAR Lighting Partner Meeting - March 17-19, 2009

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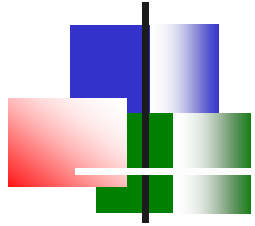


# Welcome

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- Welcome and thank you for your interest in attending the 2009 ENERGY STAR Lighting Partner Meeting and this presentation entitled, Understanding LED: An Overview of the Technology and the Market
- I am Brian Owen and I will be your Host for the next 60 minutes: 60 minutes in which we hope that you will be able to take away part of today's discussion and employ it in your day-to-day work. As a brief introduction to my background, I am the Program Advisor to greenTbiz Toronto, an Energy Efficiency program for businesses and commercial property owners, engaged by the Ontario Power Authority and Toronto Hydro, as well as being the Facilitator of the LED City Toronto initiative. We are also quite familiar with LED and ENERGY STAR, being part of the process of creating the ENERGY STAR Criteria for DLS (SLEDs). Some of you may know me as the Canadian Columnist and Contributing Editor of LEDs Magazine and co-writer of the ENERGY STAR reports.
- In past, I moderated an IDEX / NeoCon Canada presentation, an LED Panel entitled 'Efficient Lighting with LED ... the 100% Solution to 20% of the Energy Problem' referring to the fact that over 20% of electricity is consumed by lighting.
- This has not changed, but the technology has: technology that will lead to substantial energy reductions, cost savings and resultant environmental benefits. That technology, which we are here to discuss today, is Light Emitting Diode or LED. There have been significant advancements in LED technology over the last year and further progress in commercialization, both accelerating and leading to market transformation.





# My View – Brian Owen

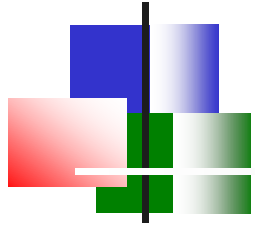
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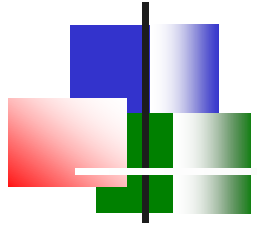
- I did not begin this quest as I am not a lighting expert, an engineer or an LED expert. My corporate history related to the industry includes:
  - Billing Verification & Error Calculation
  - Energy Conservation & Efficiency
  - Commercialization & Market Transformation
  - Program Design for Commercial Associations, Government, Municipalities & Utilities
- So how did we get started?
  - Business Improvement Areas (BIAs)
  - Holiday Lights (DLS / SLEDs) in 2003
  - 10/90 to 90/10, From Inception to ENERGY STAR
- Key fundamental principles were the same
  - Environmental Practices
  - Commercialization
  - Market Transformation
- So what makes us experts? - You do in shaping the market!



# LED City & the SSL Community

- With respect to the technology, I find it so exciting to actually live the reality of this transformation, to not just be a spectator on the sidelines but to be a part of such a dramatic change, to interact with a community of brilliance (excuse the pun) ... together, a community of change. I am honoured to be involved, to speak, to meet and be acquainted with the best and the brightest in the industry.
- Not only does City have geographic definition, it represents a collective and Community infers collaboration, contribution, empowerment, engagement, involvement, ownership and sharing.
- Hence my personal definition of an LED City and Community is both geographic and collaborative.



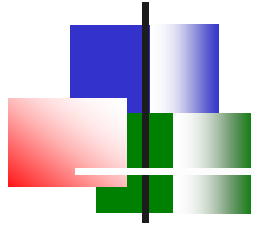


# Why Are We Here?

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- Education & Tools



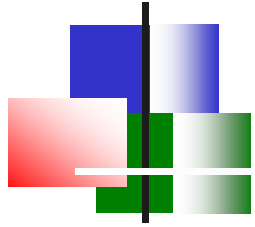


# Deliverable Objectives

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- Some of the deliverable objectives that we wish to impart are:
  - 1. Awareness of the myths and untruths.
  - 2. How to discern truths and untruths.
  - 3. Where does LED / SSL make sense?
  - 4. How to develop selection criteria.
  - 5. How to develop a protocol for luminaire / manufacturer review.
  - 6. How to develop a payback equation to overcome 1sts costs.
  - 7. A review of lessons learned and resultant best practices.





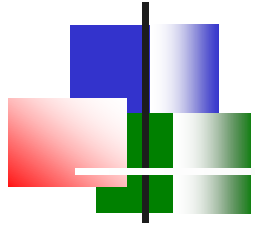
# Your Turn!

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- What are your learning objectives?
- What you need or want to know?





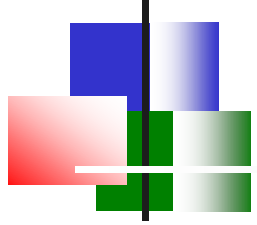


# Interaction

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- It is intended for the presentation to be highly interactive so as to create dialogue and to allow for your input and participation. One way that we want to do this is by getting to know you as a group.
- Show of hands;
  - 1. Utilities
  - 2. Energy Efficiency Organizations & Programs
  - 3. Government
  - 4. Architects, Engineers, Project Managers, Property Managers
  - 5. Interior Designers, Lighting Consultants & Designers
  - 6. Lighting Industry (SSL Industry)
  - 7. Retailers
  - 8. Academic, Educators, Students





# What is at Stake?

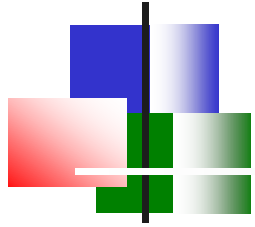


# U.S. Energy & Lighting Statistics

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- 8.3% of Primary Energy (Fuel)
- 22% of Electricity Energy
  - Commercial – 51%
  - Residential – 27%
  - Industrial – 14%
  - Outdoor – 8%
- Residential accounts for 6% of Electricity Energy

(From the U.S. DOE)





# e-Newsire

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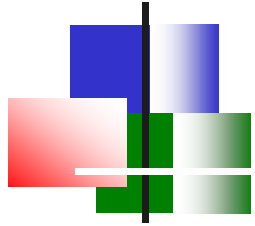
FlexYourPower.org

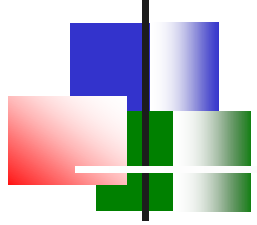
California's Energy Efficiency Resource

Oct. 1, 2008 / #630

## **Fast Fact**

LEDs will save Americans \$280 billion in energy costs over the next 20 years, and will make up 70% of the market by the end of that period. (Source: U.S. DOE, via "Bright Future," The Wall Street Journal)

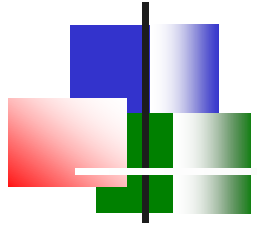




# Boo, Scary Reality!

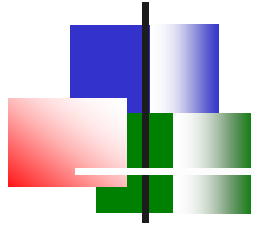
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# What are the Issues?



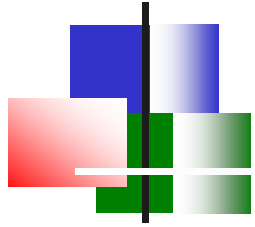


# Convergence or Divergence?

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- Managing Expectations
  - Technological Advancement
  - Expectations
  - Discerning Reality and the Truth
    - (Somewhere in Between!)
  - Value
    - (Perceived or Realized)



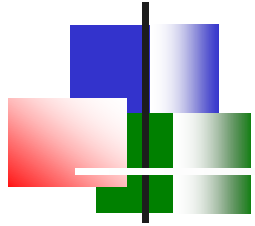


# Expectations!

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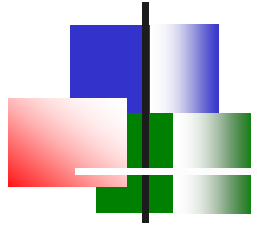
# Disappointment!

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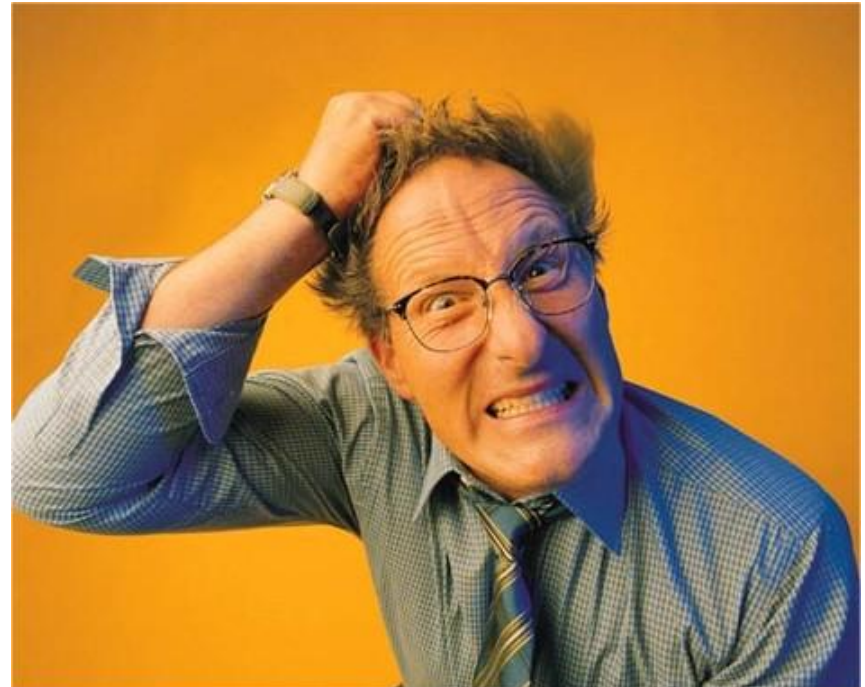
**PREPARE FOR DISAPPOINTMENT.**

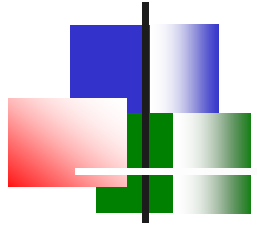




# Frustration!

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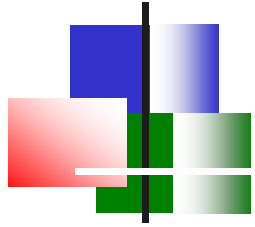
# Confusion?

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Oh what to do?

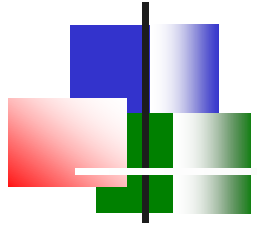




# Mystery?

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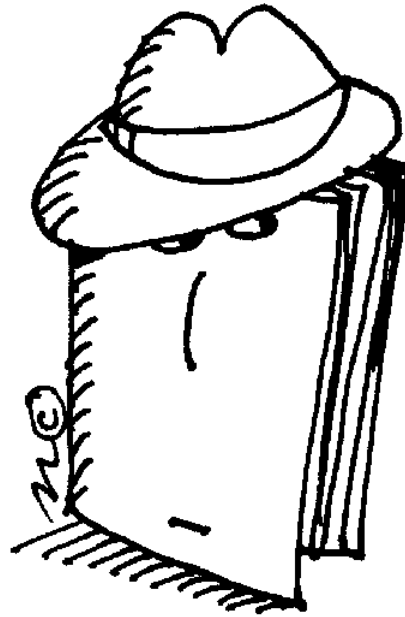




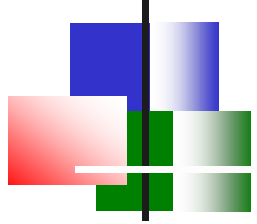
# Intrigue?

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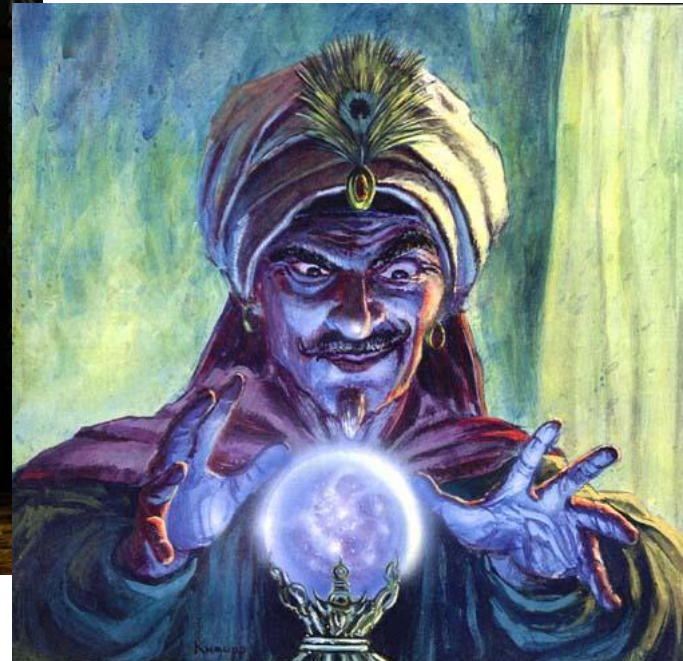
- Literature like a sketchy mystery novel!



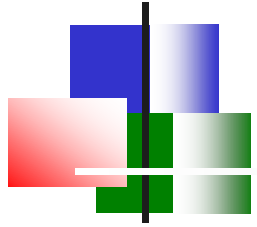




# Mysticism?

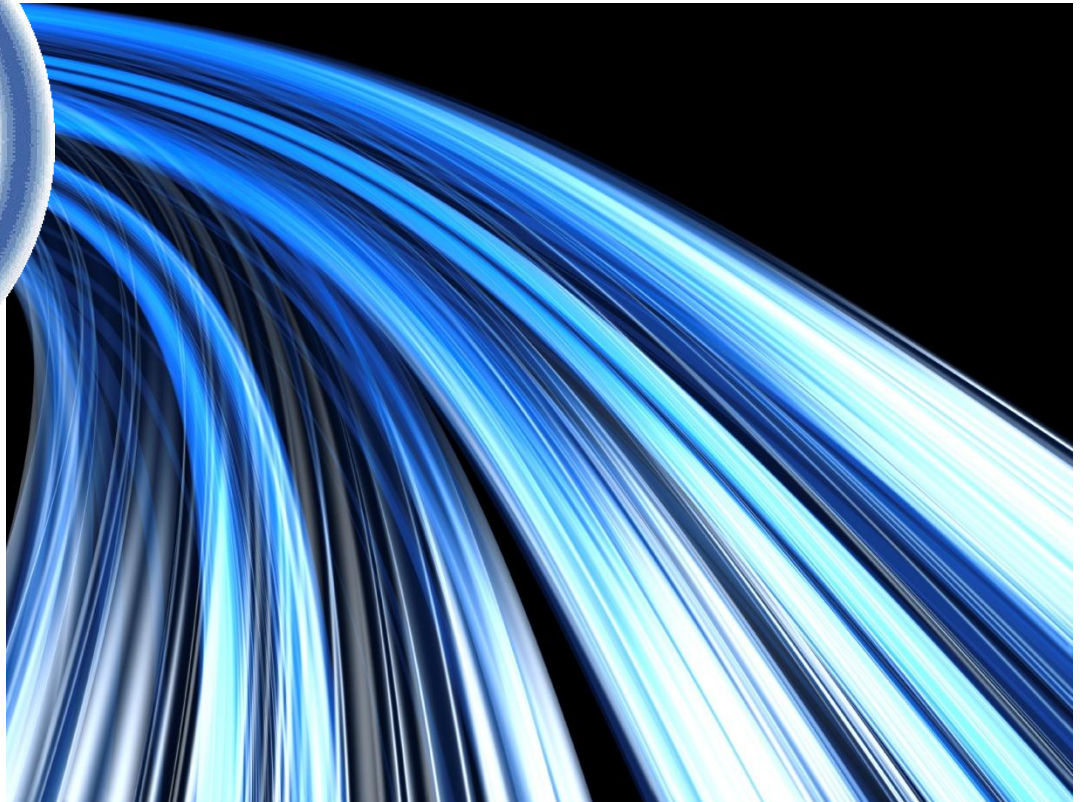


However, performance is predictable!

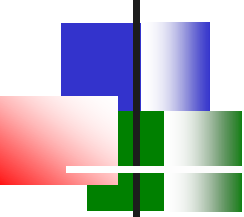


# I Need Information, BUT!

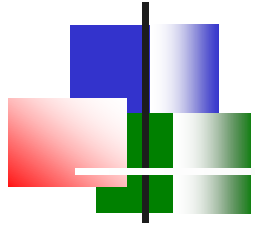
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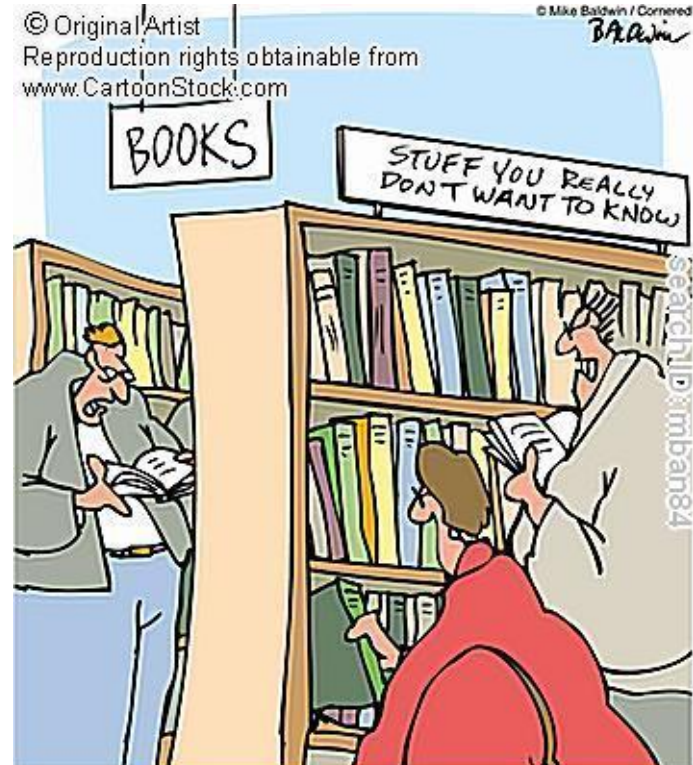


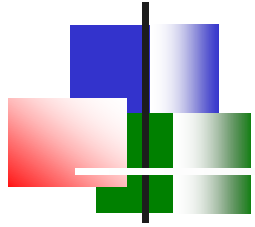




# What Do I Need to Know?

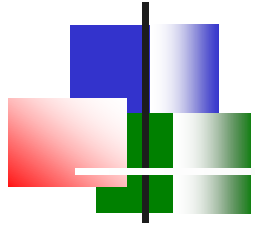
- How Much is Too Much?





# Collateral Damage!



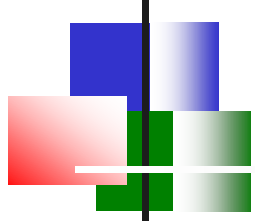


# Can You Handle the Untruth?

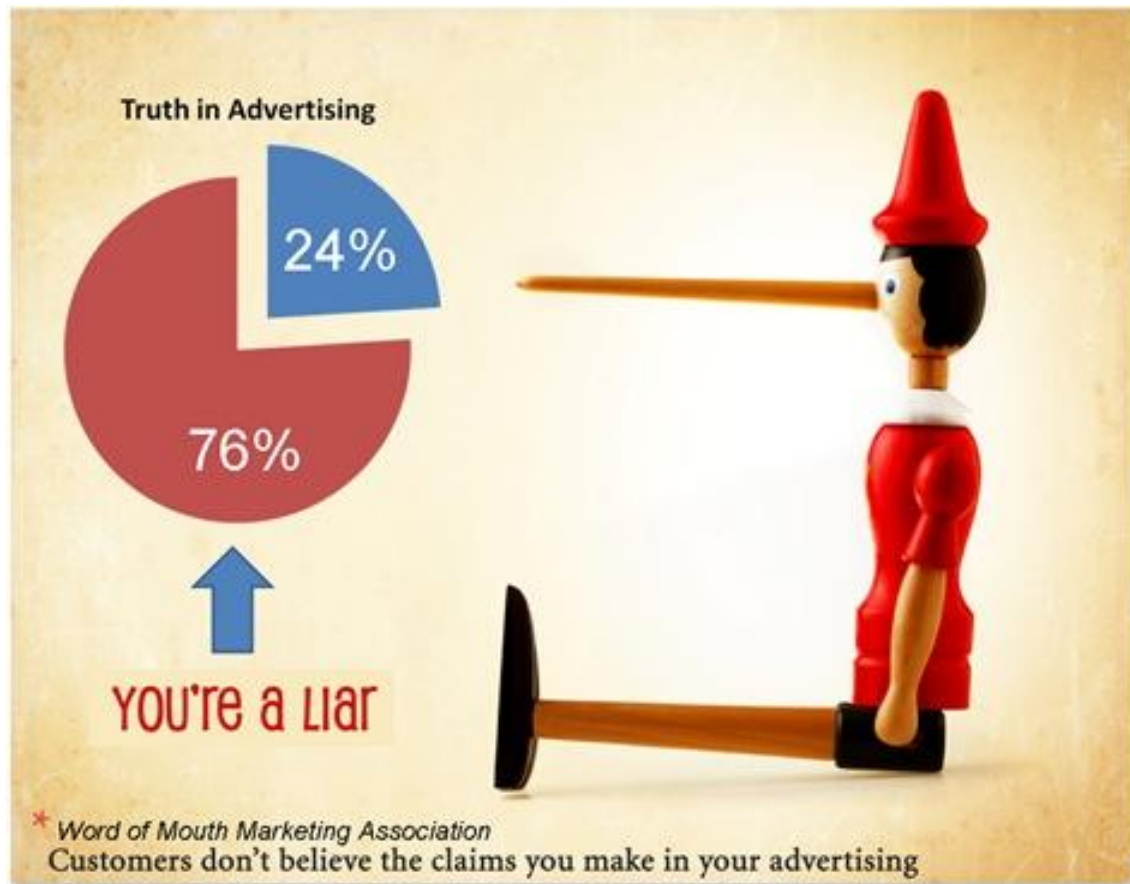
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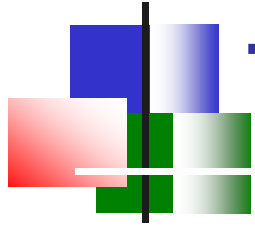
are YOU ready for this?



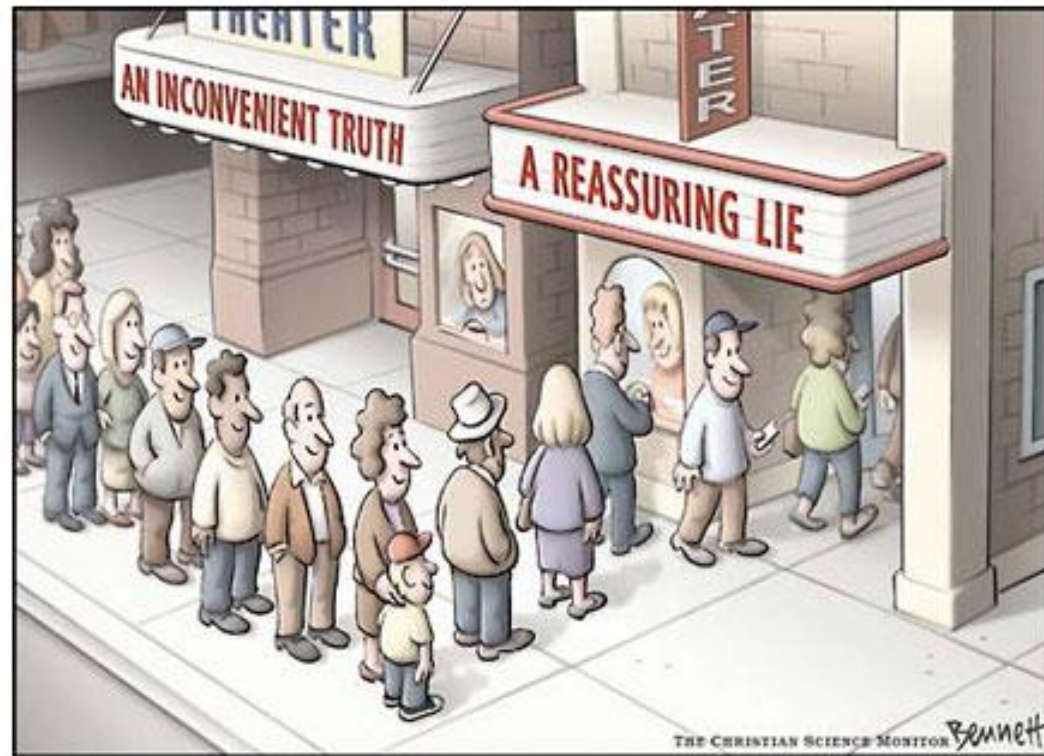


# Truth in Advertising?

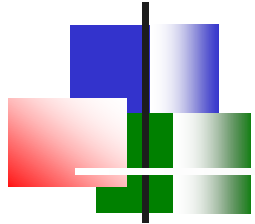




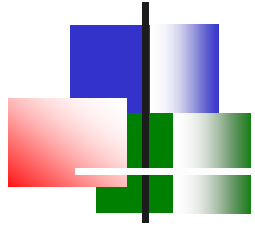
# Truths, Myths or Outright Lies!





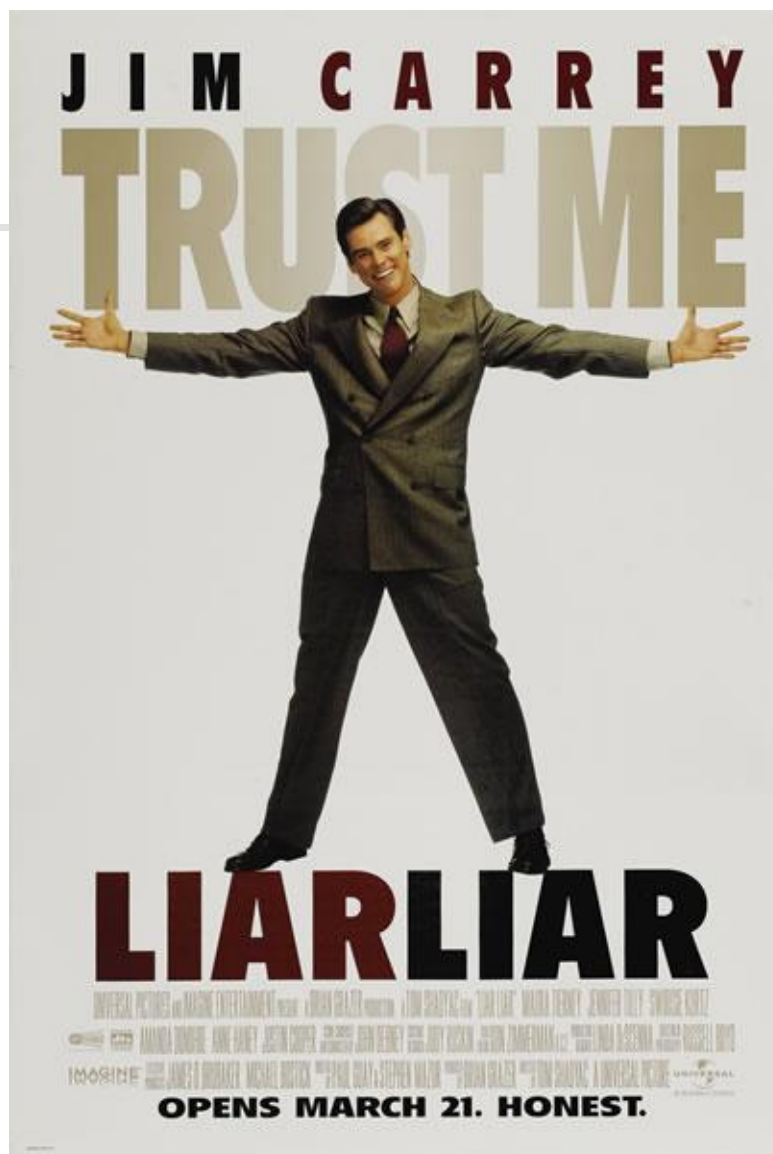
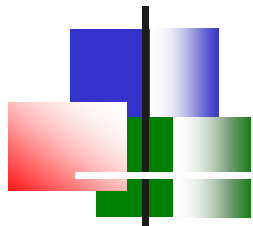


# Agents, Distributors & Manufacturer's Representatives

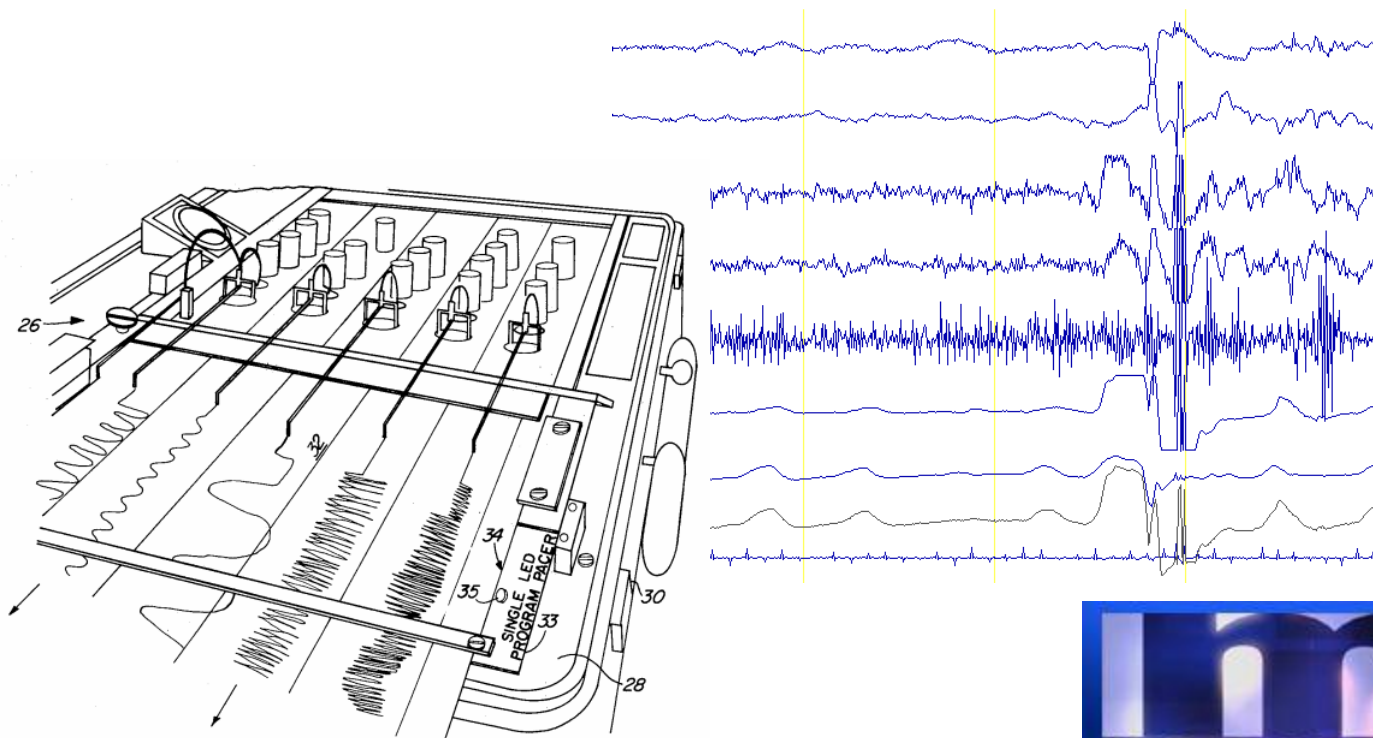
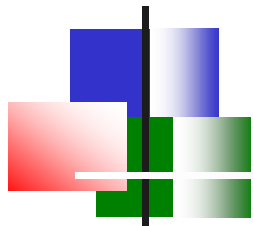


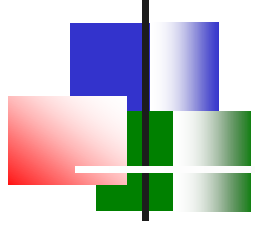
- Is the distribution model 'broken'?









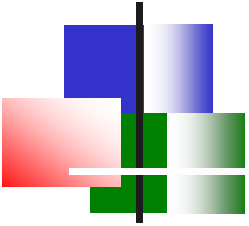


# Our Guest

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- Mr. S. S. LeDeception, Director of Marketing & Sales from FG&E Luminaires, distributed by DSH Lighting

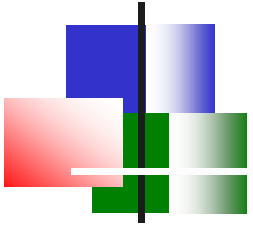


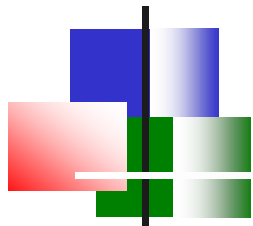


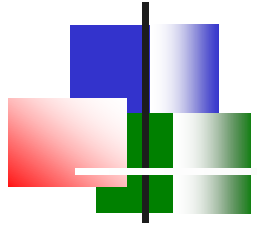
- You said that LEDs last forever!
  - We found that you were using data from the LED chip manufacturer, not taking thermal management into consideration.
- You said that your LED Luminaires produce the same light output as incumbent light sources!
  - Again, we found that you were using data from the LED chip manufacturer without optical or thermal loss.
- You said that energy savings and less maintenance will pay for the LED lighting in less than one year!
  - We found that you were using questionable energy, maintenance and replacement assumptions.
- You said that you were the manufacturer!
  - We found the very same product on 15 other websites!
- You said that you were CSA and UL approved!
  - In fact, we found that your safety labelling was falsified!



# LAB

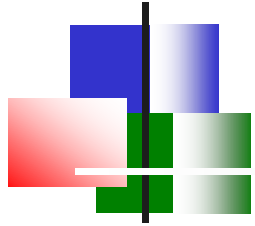






# Could this Deceit be True?





MarketWatch

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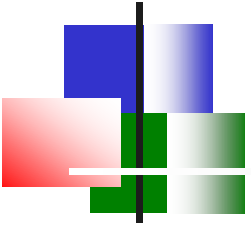
## **UL Warns of Counterfeit LED Light Displays**

**NORTHBROOK, Ill., Sept 29, 2008 /PRNewswire via COMTEX/ -- Underwriters Laboratories (UL) is notifying consumers and retailers that LED light displays sold by Brite Ideas have not been evaluated for safety by UL. They bear holographic UL Marks for the United States that are not authorized for use on products marketed by Brite Ideas.**

SOURCE Underwriters Laboratories

<http://www.UL.com>





- (FGE - Fairlee, Good & Expensive)
- (DSH - Dewie, Stickem & Howe)





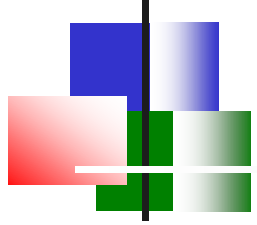


# Caveat Emptor! & Warranty?

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- On the Product – DEFINITELY!
  - How long? – Payback period?
  - Warranty on what? – Component failure?
  - What constitutes failure? (monitor pixel example)
- What about the Company?
  - Will they be around to fulfill the warranty?
  - *'3 year warranty but we're sorry the number you have dialed is no longer in service'*
- Credibility & Reputation
  - Replacement & Support

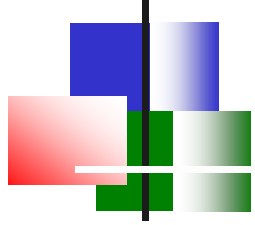




# Value?

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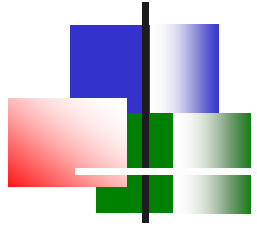


# Other Considerations

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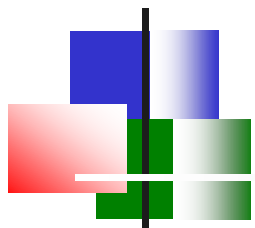
- Negative affects & exploitation of increased interest.
- Eagerness can result in imprudent and unwise decisions.
- Objective data but still subjective selection.





So, What do  
we do Now?



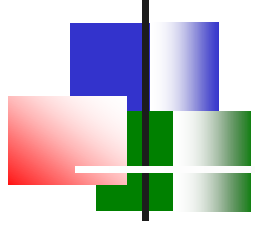


# Your 1<sup>st</sup> Line of Defense!

- On the Front Line & Standing Guard!
  - CALiPER
  - DOE ENERGY STAR for SSL 1.1
  - Lighting Facts



© Tony Northrup

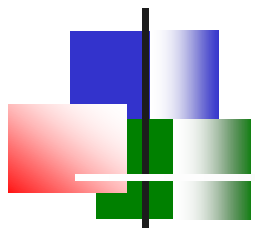


# Scott Riesebosch

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- Scott Riesebosch has a degree in electrical engineering from McMaster University and has been designing and manufacturing high output LED light engines and luminaires since 1998 when the first high output LEDs came to market. He is the President of CRS Electronics, an electronic contract manufacturer that specializes in LED sub-assemblies. Mr. Riesebosch has been a speaker at a number of conferences, educating businesses and consumers in an effort to assist them in making better and informed purchasing decisions regarding LED technology. LED lighting applications, in which Mr. Riesebosch has been involved, include military, aviation, medical, retail signage, automotive, flashlights, emergency vehicles, architectural, underwater, theatrical, street lighting, and interior lighting replacements.





# Procurement & Specification

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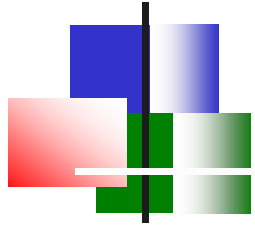
- Scott will discuss Questions to Ask in the procurement and specification process.
- It is our intention to develop a procurement guide for government, municipalities and specifiers. While attempting to be non-prescriptive or technology neutral, it is difficult to ask for LED without asking for LED. One key element or possibility may be a performance specification guideline or metrics, with suggested values or simply a template, which can be adapted for any application or site scenario. As Scott will indicate; you have to know the questions in order to get the answers!, one of my many Owenisms which you will see later in the presentation.
- We are also working with the DOE and PNNL to develop a series of 'How to Read' guides for interpretation of photometric files and test reports, the recent LM-79 and the even more recent LM-80.



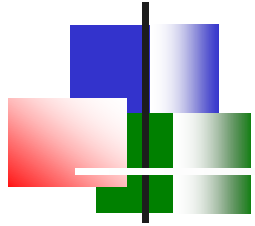
# Performance, Testing & Selection

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- Myths & Truths
- CALiPER Testing
- DOE ENERGY STAR for SSL 1.1
- Lighting Facts
- Lessons Learned & Best Practices
  - in how to develop selection criteria
  - a protocol for luminaire / manufacturer review
  - a payback equation to overcome 1st costs
- Questions to Ask (Q2A)







# Questions to Ask (Q2A)?

---



# betaLED (RUUD)

LEED CERTIFICATION GUIDE



## LED Lighting Systems In Sustainable Building Design

kramer  
.....LED  
A RUUD LIGHTING COMPANY

beta  
LED  
A RUUD LIGHTING COMPANY

### Questions to Ask When Specifying an LED Lighting System

#### LIFE PERFORMANCE

- ← What is the predicted life performance for the LED system per the IESNA LM-80 testing protocol?
- ← What is the life rating of the driver?
  - Are there any temperature limitations for the driver?
  - What are the performance specifications for the driver?
    - Efficiency, THD, Power Factor
  - Is the product adequately protected against electrical transients?
- ← What is the predicted impact of ambient operating temperature on life of LEDs?
  - On the driver?

#### PHOTOMETRIC PERFORMANCE

- ← What is the total initial lumen per watt rating of the luminaire?
  - (i.e. total system lumens per watt)
- ← Are photometric files (data per IESNA LM-79) available?
  - Was photometry performed by an independent laboratory?
- ← What is the range of light outputs available from the luminaire?

#### WARRANTY AND CERTIFICATIONS

- ← What is the luminaire warranty?
  - For the complete mechanical assembly?
  - For the electrical & LED components?
  - For the finish?
- ← Is the product certified for operation in the intended country of use? (UL, CUL, CE, etc)

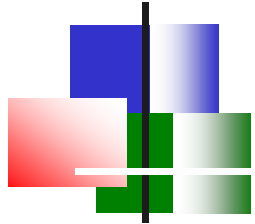
#### COST

- ← What is the first cost for the system?
- ← What are the anticipated maintenance costs for the system over its life?

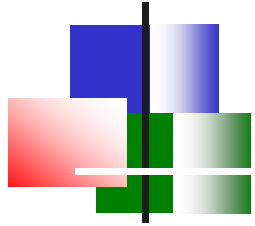
#### OTHER SYSTEM ATTRIBUTES TO CONSIDER

- ← Robust mechanical design – die cast aluminum or other materials?
- ← Is cooling of the LEDs passive or active?
- ← Is the product environmentally friendly?
  - Housing – recyclable?
- ← Are the luminaires repairable?

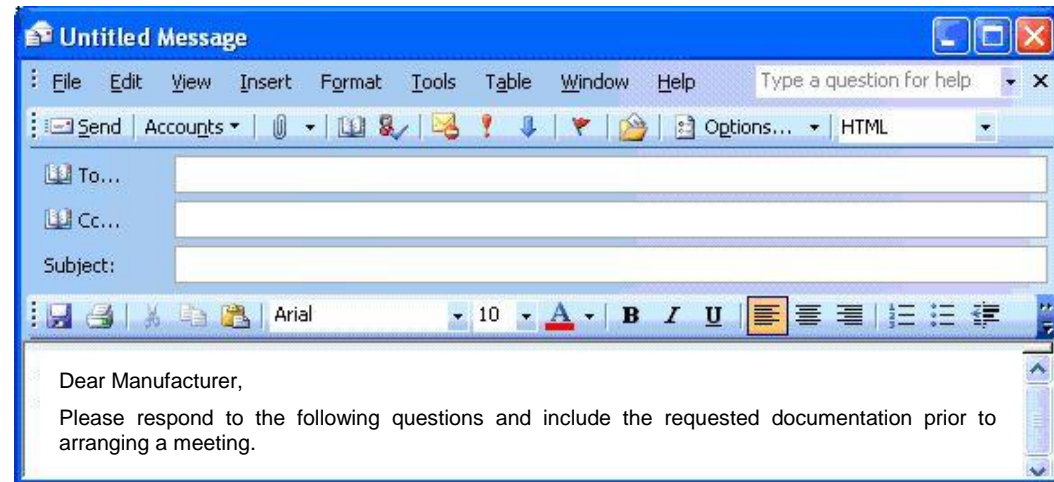
LEED Certification Guide | 13



<http://betaled.com/ordering.aspx>

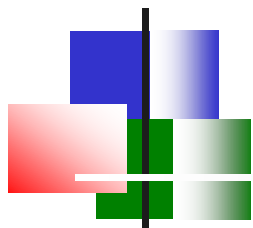


# LIGHTSWITCH



Avraham Mor

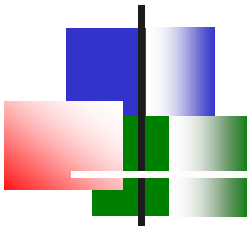




### WEB EXCLUSIVE: Jane DOE goes shopping - Experiences from the CALiPER program

- Mystery buyers that make anonymous purchases of LED products for the CALiPER program have learned some important lessons about the buying experience.
- [Editor's note: The following material describes authentic encounters experienced by the CALiPER mystery shoppers, and related to LEDs Magazine's Contributing Editor, Brian Owen.]
- (CALiPER background information omitted)
- The primary purpose of CALiPER is to provide technical data about key performance attributes of LED lighting products. This information can be used by buyers and distributors and manufacturers to learn how to recognize and select high-performing products, and by manufacturers who need to know what competitive challenges they face as they enter the marketplace. Unexpectedly it was discovered that some of those challenges might include product availability and customer service.
- Several "Jane and John Does" make anonymous purchases of LED products for the CALiPER program. CALiPER buys products from around the USA through a variety of different channels, including online, wholesale distributors, retail stores, and direct from the manufacturer.
- Initially, the program was not terribly concerned with the shopping experience; instead, the focus was solely on the products and how they measured up in the testing lab. But then they realized that difficulties encountered while trying to obtaining LED products could seriously impact consumer opinion as well.



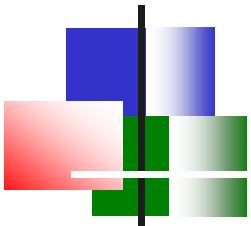


## CALiPER's Jane DOE - 2

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- While not all of the shopping trips have been negative, the CALiPER purchasing team has encountered several purchasing problems numerous times. As a lighting manufacturer or distributor, you may wish to ask yourself these important questions before putting your product - and your reputation - on the market:
  - 1. Is your product really available?
- Press releases have gone out, the product is featured prominently on websites and in magazines, and the industry is excited by the latest, greatest LED luminaire. Can we buy it? Sure, it's on sale now! Well...maybe not now. But soon.
- Approximately one-third of the products the CALiPER team has ordered to date were delayed by one to three months, even though all were advertised as readily available. There have even been instances when a credit card has been charged, but no product was shipped for several weeks.
- Some purchasing experiences have been frustrating. In August 2007, one of CALiPER's anonymous buyers contacted a company about an LED desk lamp. This lamp had received quite a bit of press, so the DOE program was eager to test it. Over the next five months, 'Jane DOE' had multiple communications with the company, which always maintained that the product was "coming soon" or "sold out." A sample was finally provided in January 2008.
- CALiPER buyers report that the longest wait for an item was for an LED track light. Ordered in November 2006, it was finally received in September 2007. Yikes! Hopefully it contained a next generation of LEDs and produced more lumens per watt in that year of waiting.
- While these are the more extreme examples of delay from the CALiPER archives, they are not that different from other LED buying experiences. If this had been an actual consumer, would they have been so tenacious and forgiving? Probably not.





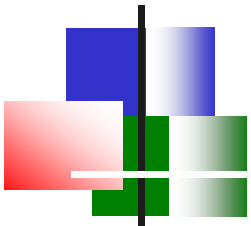
## CALiPER's Jane DOE - 3

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- LEDs Magazine advice:
- If your product is not available, let your customers know and give them your best assessment as to when it will be available – honesty is a good way to build customer loyalty.
- 2. Do you know who your distributors are?
- If you are a manufacturer, you want to make sure that your distribution channels are open and working smoothly. It was a little surprising to the CALiPER purchasing team to realize that this is not always the case.
- Case in point: while reviewing a manufacturer's website, a CALiPER buyer came across a new A-lamp. Selecting a fairly large distribution company from the online list, she called to order the item. The salesperson who answered was bewildered: "We are not a distributor for YYY Lighting." The buyer pointed out that his company was listed on the YYY Lighting website, but he still had no idea what she was talking about.
- It turned out that he was correct. Although the manufacturer had made overtures to the distribution company, no formal relationship had been finalized. Amazingly, this is not an isolated incident.
- LEDs Magazine advice:
- If you list distributors on your website or sales materials, make sure the information is accurate and up-to-date.





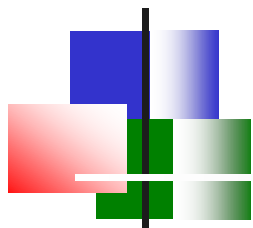


## CALiPER's Jane DOE - 4

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- 3. Is your sales force really selling your product?
- This is a classic marketing problem. Once again, it is best illustrated by a true story. An LED downlight went on sale at a local lighting showroom. A CALiPER buyer called and had a conversation with a salesperson that went like this:
  - Jane: Hi, I understand you have some LED downlights for sale. I'm really interested in buying one.
  - Salesperson (lowering voice): Oh, uh...you don't want that product.
  - Jane: Yes, I do! It's energy saving, right? I'm all about saving energy.
  - Salesperson: Yes, it saves energy, but it's just too expensive. What you want is a fluorescent fixture. They save almost as much energy and they're less expensive.
  - Jane: I'm thinking about replacing the downlights in my kitchen with this LED fixture.
  - Salesperson: Oh, it's got a very nice color, but fluorescent lights have improved quite a bit. I'm sure we could find a color you'd be happy with.
- As a manufacturer, how can you convince your sales force to sell your new LED products, especially if you do not have direct control over sales? Educating the public will stir up demand, but if your sales force is not enthusiastic, your LED fixtures and lamps will remain unsold. One possible solution may come from a lesson learned from CALiPER program representatives while working with CFLs. Interested in how distributors and lighting salespeople learn about new products, an informal poll was taken. The thought was that most people in the industry relied on trade magazines, the internet, or maybe tradeshow to keep up with trends and technology, but overwhelmingly, the number one trusted source for new lighting information was ... the sales representative.



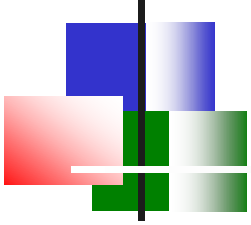


## CALiPER's Jane DOE - 5

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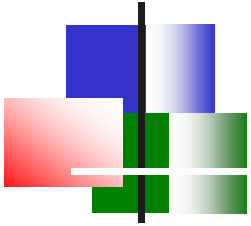
- The first few times the inquirers were told this they were unsure they heard correctly: "Are you telling us that the source of information you trust the most is the guy trying to sell you a product?" The respondents nodded affirmatively, explaining that the sales representative and the lighting buyer had developed a long-term relationship based on honesty and friendship. The rep helps the buyer find products that make his customers happy and the buyer rewards the rep with continued business.
- LEDs Magazine advice:
- Keep in mind that this conclusion is based on an informal poll of lighting buyers and your distribution channel might be quite different. However, if you have limited marketing resources, it might be a good investment to focus most of your marketing and training on the sales force instead of the buying public.
- 4. Do you have the answers?
- Pop quiz: Which of these numbers indicate a warm colour: 2700K or 6500K?
- This may seem like a no-brainer to you, but the CALiPER purchasing team has talked to many salespeople and distributors who could not answer fundamental questions about LED products, including this one.
- LEDs Magazine advice:
- Anyone who might interact with a customer should have LED and lighting basics under their belt.
- 5. Returning the favour?
- An online distributor sold CALiPER some A-lamps that were advertised on the box as lasting for 35 years. When one of the bulbs failed, the buyer called for an exchange, only to be told that there was a "14 day return policy" which was not at all evident on the website, nor was it written on the invoice. Of course, this was just after the 2-week deadline. After pointing out that quite a bit of money was spent on a product that was supposed to last 35 years, the buyer was transferred to a supervisor. That person eventually authorized a replacement to be sent.





- **LEDs Magazine bottom line:**
  - How many times have you gone to a new restaurant only to find that the food was bad or the service was terrible? Did you ever go back to that restaurant for a second try? What if the food was overcooked but the server was helpful and prompt and the maitre d' apologetic? Such attentive customer service might be enough to persuade you to try again some time.
  - The CALiPER purchasing team has encountered helpful salespeople who went out of their way to provide good customer service, but the issues recounted here were not uncommon. Yes, quality and performance still matters, but having available products, a responsive distribution channel and knowledgeable staff can make a favorable first impression that can help overcome initial market barriers. Consumers will respond to your superior customer service, perhaps helping to transform them into lifelong customers.



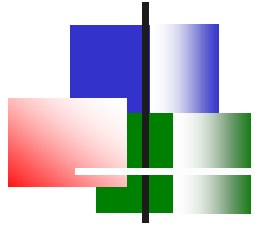


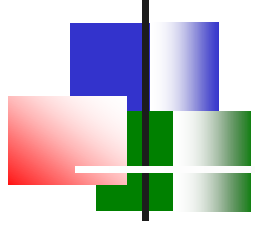
# OWENisms

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1. Know how to choose and where to use.
2. You need to know why you want to buy.
3. You have to know the questions in order to get the answers.
4. Design the education and educate the designers (specifiers & buyers)
5. LED ... Listen, Educate, Demonstrate (Daryl DeJean, Emerging Technologies Associates, Inc / PG&E)
6. LED ... Locate, Engage, Discuss (Develop partnerships & stakeholder collaboration)
7. LED ... Lies, Exaggerations, Denials (Dr. Robert Adams, Ph.D., Chips and Wafers, Inc.)
8. You can't buy SSL on price point.
9. It is not a case of if, but simply a case of when, and where. (Greg Merritt, CREE)
10. There is no shortage of inferior products and overstated claims.
11. It is the quality of light (CCT & CRI) rather than the quantity - People like light(ing) that they like!
  - A. Energy Efficiency over quality; NO
  - B. Quality over less lumens; YES
12. You can talk about Energy Efficiency until you are 'blue' in the face; and you will be with inferior product.
13. Light the spot and not where it's not! (Light pollution & trespass)
14. Ifs and buts are lumens and watts.
15. 16. The truth is out there!, but trust no one until they earn it!
16. Buy less (fewer lamps), replace less (fewer lamps) and dispose of less (fewer lamps)! (John Curran, LED Transformations)
17. Not a fan of the fan. (Active cooling versus Passive cooling)
18. Don't Waste Electrons, Don't Waste Photons, Keep Cool! (Mia Paget, PNNL)
19. Luminaire Design is Affecting Standards and Standards are Affecting Luminaire Design (Kevin Dowling, PHILIPS)
20. Understand or UnderSTANDARD!







# Stakeholder Engagement

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- Engage all stakeholders from the onset, ensuring that they are 'on board' as this is extremely important.
- Finance (Capital & Operating) and Purchasing must work together to overcome 1<sup>st</sup> cost barriers.
- This would also be highlighted as a major procurement barrier or opportunity if initiated correctly.

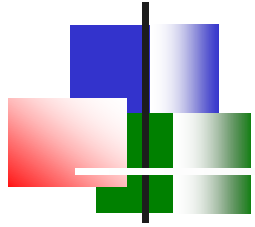


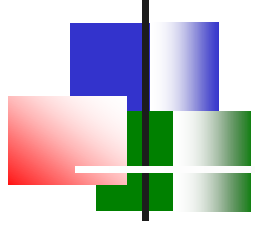


# 5As Framework for Market Transformation

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- Awareness
- Availability
- Accessibility
- Affordability
- Acceptance





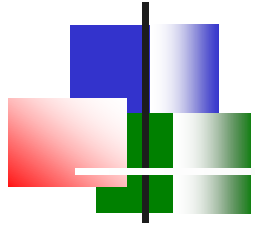
# As it applies directly to LED Lighting

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- Stylish, marketable, functional and available at a price that end-users (consumers) will pay.

Terry McGowan , ALA





# Where Does It Make Sense?

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## YES

Commercial

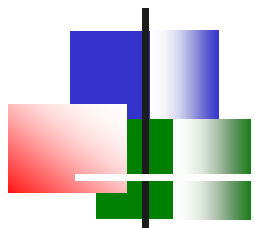
Downlights

## NOT RIGHT NOW

Residential

Linear Fluorescent  
Replacement



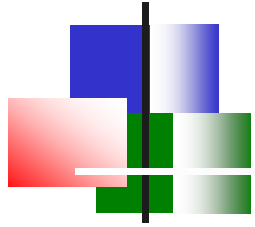


# Incentives & Rebates

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- Programs that involve I&R are essential to increase adoption and promote market transformation through assisting to overcome higher initial costs and reduce the payback period.
- In understanding this essential, it is an even greater requirement to ensure the availability of quality, stable product to incent.





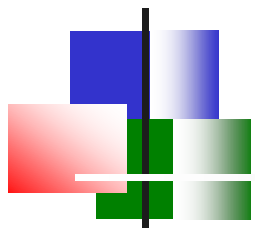
# Project Projection'

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## *'Project or Reject'*

- Stakeholder Engagement
- Involvement & Roles
- Challenges & Obstacles
- Trials & Tribulations
- Triumphs
- Outcomes & Results
- Lessons Learned
- Best Practices





# A History of “Lessons Learned”

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- The definition of ‘insanity’

Compact Fluorescent Lighting in America:  
Lessons Learned on the Way to Market

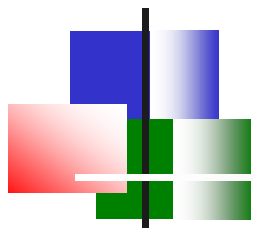
Prepared by  
Pacific Northwest National Laboratory

for  
U.S. Department of Energy  
Office of Energy Efficiency and Renewable Energy  
Building Technologies Program

June 2006





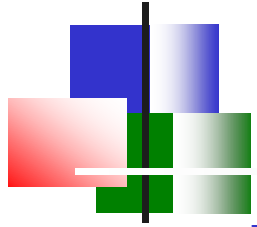


# I Need Information?

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- So where can I get more information?
- This is a question that we hear regularly as people are eager for credible and reliable resources.





# Suggested Resources

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- US Department of Energy (DOE) SSL

Programs - ENERGY STAR, CALiPER, GATEWAY, Quality Advocates (Lighting Facts)

Competitions - L Prize, Lighting for Tomorrow, Next Generation Luminaires - SSL

- [www.ssl.energy.gov](http://www.ssl.energy.gov)

- DOE ENERGY STAR for SSL1.0 / 1.1

- [www.ssl.energy.gov/energy\\_star.html](http://www.ssl.energy.gov/energy_star.html)

- IESNA

- [www.iesna.org](http://www.iesna.org)

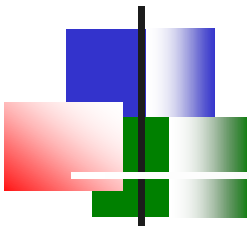
- IALD - Lighting Designer Roundtable Report & Design Guide

- [http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/designer\\_roundtable\\_report\\_final\\_apr08.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/designer_roundtable_report_final_apr08.pdf)

- LEDs Magazine

- [www.LEDsMagazine.com](http://www.LEDsMagazine.com)





# U.S. DoE - SSL

Solid-State Lighting

Page 1 of 1

U.S. Department of Energy  
**Energy Efficiency and Renewable Energy**  
*Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable*

[EERE Home](#)

**Building Technologies Program**

**Solid-State Lighting**

**DOE SSL Strategy**

**R&D Project Portfolio**

**Market-Based Programs**

- ENERGY STAR
- CALPER Program
- Standards Development
- Technical Information Network
- Technology Demonstrations
- Design Competitions

**Using LEDs for General Illumination**

- LED Basics
- LED Application Series
- LED Measurement Series

**Funding Opportunities**

**Publications**

**Related Articles**

**Home**

**DOE Solid-State Lighting Portfolio**

The U.S. Department of Energy and its partners are working to accelerate advances in solid-state lighting — a pivotal emerging technology that promises to fundamentally alter lighting in the future.

No other lighting technology offers the Department and our nation so much potential to save energy and enhance the quality of our building environments.

**L\*PRIZE™**

The L Prize competition challenges the lighting industry to develop high-performance solid-state lighting products to replace the common light bulb. [Learn more.](#)

**■ UPDATES [Register for Updates](#)**

- ▶ DOE Responds to EPA Issuance of Solid-State Lighting Criteria (PDF 30 KB)
- ▶ Webcast: ENERGY STAR for SSL June 26, 2008
- ▶ DOE Releases Funding Opportunity for SSL Product Development (Round 5)
- ▶ Voices for SSL Efficiency 2008 DOE SSL Market Introduction Workshop July 9-11, 2008
- ▶ DOE Releases Funding Opportunity for SSL Core Technology Research (Round 5)
- ▶ SSL Core Technology Research Call Issued (PDF 80 KB)
- ▶ DOE Publishes Lighting Designer Roundtable Report (PDF 786 KB)
- ▶ DOE Releases Report on FAA Demonstration (PDF 2 MB)
- ▶ Transformations in Lighting: DOE SSL R&D Workshop January 29-31, 2008 -Workshop Report (PDF 2 MB)
- ▶ DOE releases updated SSL R&D Multi-Year Program Plan FY09-FY14 (PDF 3 MB)
- ▶ DOE Seeks to Pre-Qualify Testing Laboratories (PDF 110 KB)
- ▶ DOE Publishes CALPER Roundtable Report (PDF 154 KB)
- ▶ Archives

**■ R & D SPOTLIGHT**

- Increasing efficiency of green LEDs
- Nitride-based photonic crystal sources
- Record efficacy in white OLED

**■ COMMERCIALIZATION SUPPORT SPOTLIGHT**

- DOE ENERGY STAR for SSL
- IES collaborates on Design Guide, Roundtable
- NGLIA collaborates on ENERGY STAR criteria, MYPP updates

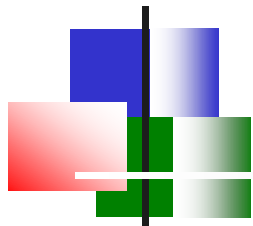
[Webmaster](#) | [Security & Privacy](#) | [Building Technologies Program Home](#) | [EERE Home](#)

U.S. Department of Energy

<http://www.netl.doe.gov/ssl/>

29/06/2008





# Lighting Designer Roundtable Report

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## Lighting Designer Roundtable on Solid-State Lighting

Chicago, Illinois  
March 19, 2008

Hosted by:

*U.S. Department of Energy  
International Association of Lighting Designers (IALD)  
Illuminating Engineering Society of North America (IESNA)*

**Final Report  
April 2008**



*Prepared for the U.S. Department of Energy by Akoya*



SOLID-STATE LIGHTING  
**Roundtable**



# LEDs Magazine

LEDs Magazine - LED Technology, Solid State Lighting and other LED Applications

Page 1 of 1

NAME	NEWS	ARTICLES	PRODUCTS	LEDS	EVENTS	TOP NEWS FEED
Account	NEWS FEED	ARTICLES	PRODUCTS	COMPONENTS	EVENTS	CONTACT US

### Technology and Applications of LEDs

**WELCOME**

The major news of LEDs magazine is now available in LEDS magazine in Hindi. LEDs magazine has moved our new page number to 44 (BPT) 196 762.

Energy saving and environmental friendliness are the main advantages of LED lighting.

**ARTICLES**

Advances in the field of LEDs magazine. The major news of LEDs magazine is now available. LEDs magazine is now available in Hindi. LEDs magazine has moved our new page number to 44 (BPT) 196 762.

**LATEST PRODUCT**

OSRAM and Philips have announced the development of a new LED lighting technology. The new technology will allow LEDs to be used in a wide range of applications. The new technology will also allow LEDs to be used in a wide range of applications.

**Acrylic**

Acrylic is a transparent plastic material that is used in a wide range of applications. Acrylic is a transparent plastic material that is used in a wide range of applications.

**SHARP**

SHARP is a Japanese electronics company that is known for its high-quality products. SHARP is a Japanese electronics company that is known for its high-quality products.

**LEDs in India**

LEDs are becoming increasingly popular in India. LEDs are becoming increasingly popular in India.

**LED Product Development**

LED product development is a complex process that involves many steps. LED product development is a complex process that involves many steps.

**Complete LED product development**

Complete LED product development involves many steps. Complete LED product development involves many steps.

**electrical & mechanical**

Electrical and mechanical engineering are essential for LED product development. Electrical and mechanical engineering are essential for LED product development.

[www.ledsmagazine.com](http://www.ledsmagazine.com)

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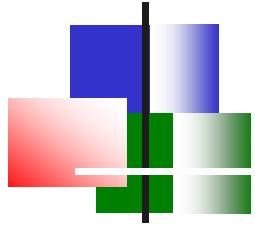
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[www.ledsmagazine.com](http://www.ledsmagazine.com)

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# Educate & Demonstrate

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- CCT
  - So which White Light is the Right Light?
- CRI
  - The complementation or complication of colour!

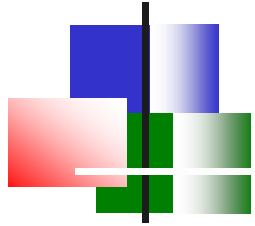


# The Designer & Specifier Chronicles!

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## From the Architect, Interior Designer & Lighting Consultants' Point of View

- Lighting Quality over Energy Efficiency
- CRI (again Quality) over Lumens





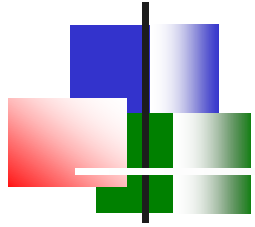


## A Lighting Designer's Perspective:

- What is the biggest positive about working with LEDs?
  - Opportunity, Toolbox
- What is the biggest concern about working with LEDs?
  - Risk

Samantha LaFleur when interviewed by LEDs Magazine

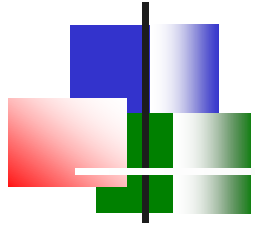




# From the LED Luminaire Designers' Point of View

- The LEDesigners' Credo
  - Don't Waste Electrons
  - Don't Waste Photons
  - Keep Cool!

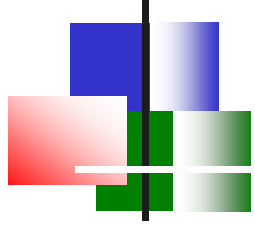




"The surest sign that a new technology has made the transformation from novelty to outright disruption is the pressing need to create new standards and organize growth."



**Architectural SSL Magazine (May 2008)**



# Design & Standards

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- Luminaire Design is Affecting Standards and Standards are Affecting Luminaire Design
  - Standards beneficially drive luminaire design and accelerate adoption, use and market growth.



Kevin Dowling, PHILIPS Color Kinetics

# Standards and Test Procedures Support



American National Standards Institute



CSA INTERNATIONAL



Underwriters Laboratories Inc.®



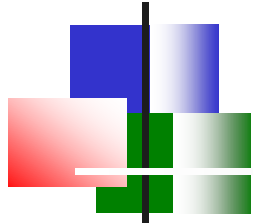
- DOE workshops

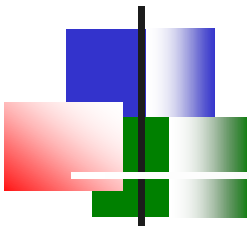
- Released:

- Chromaticity (ANSI C78.377A)
- Photometric Measurement (LM-79)
- Lumen Depreciation (LM-80)

In process:

- Safety (UL 8750)
- SSL-LED power supply (C82.SSL1)
- Definitions/nomenclature (IESNA RP-16)





## 100,000 Hour Lifetimes And Other LED Fairytals

May 28, 2008  
2:00 PM

Dr. John W. Curran, President  
Shawn P. Keeney, Vice President  
LED Transformations, LLC



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[http://www.ledtransformations.com/Lightfair\\_5-28-08.pdf](http://www.ledtransformations.com/Lightfair_5-28-08.pdf)

# John Curran

[jcurran@ledtransformations.com](mailto:jcurran@ledtransformations.com)





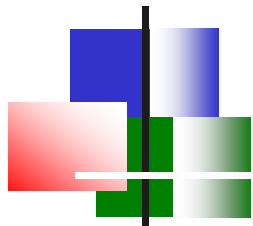
Unique Insight and Services in  
Product Strategy, Design  
and Technical Writing  
for Lighting Manufacturers

# Comprehensive Total Cost of Ownership Calculator Tool

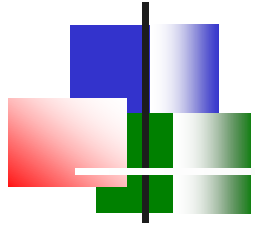
<http://www.lumenique.com/TCO/TCO Web Preview.htm>

Kevin Willmorth

[kwillmorth@lumenique.com](mailto:kwillmorth@lumenique.com)





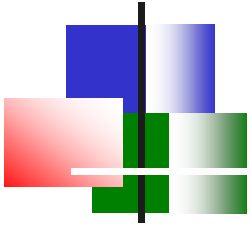


# Acknowledgements

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- Scott Riesebosch, CRS Electronics
- Alan Ruud, betaLED / RUUD
- Avraham Mor, LIGHTSWITCH
- John Curran, LED Transformations
- Kevin Willmorth, Lumenique





# Programs

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**GATEWAY  
DEMONSTRATIONS**

  
**lighting  
facts**  
SSL Quality Advocates

**L•PRIZE™**



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**Retailer  
Energy Alliance**



**LIGHTING**   
*for  
tomorrow*

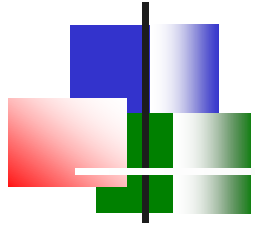
**CALiPER**

**Technical  
Information  
Network**



**LEDs**  
MAGAZINE

# STANDARDS



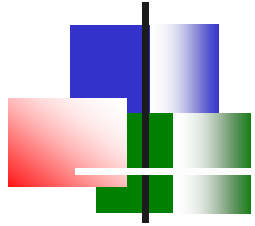
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*Tomorrow is becoming today for LED.  
It is not a case of if, but simply a case of  
when and where practical.*

*You are all part of the LED City  
... a Community of Change*



*Thank you for your attendance and  
interest.*

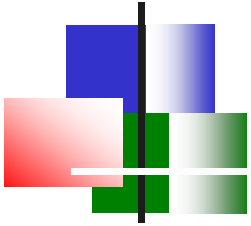


# CDM with SSL

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- 2009 ENERGY STAR Summary of Lighting Programs
- greenTbiz is an ENGO that delivers EE programs, currently to over 28,000 businesses and commercial property owners in 66 Toronto districts (BIAs) on behalf of the LDC and is partly funded by the OPA, also assisting other utilities throughout Canada
- The scope has also increased by sector to condominiums and larger businesses and commercial properties
  - Develop program delivery models
  - CDM program development
  - EM&V and TRC analysis
  - Develop awareness & education, tools
  - Provide the direction to allow you to know what your need and want
- Get help, don't try to 'go it alone'! – There is expertise!
- Recalls disrupt programs – SLEDs / CPSC recall in LEDs Magazine article





# Thank You

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**For more information, please contact:**

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416.697.9000

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